

Exhibit A Scope of Work

TECHNICAL TASK LIST

Task #	CPR	Task Name
1		ADMINISTRATION
2	X	FINALIZE DESIGN FOR WATER TREATMENT/RECYCLING SYSTEM
3		EQUIPMENT PROCUREMENT
4		PREPARE DETAILED CONSTRUCTION DRAWINGS FOR WATER TREATMENT/RECYCLING SYSTEM
5	X	EQUIPMENT INSTALLATION
6		PREPARATION AND IMPLEMENTATION OF TEST PLAN
7		TECHNOLOGY TRANSFER ACTIVITIES
8		PRODUCTION READINESS PLAN

KEY NAME LIST

Task #	Key Personnel	Key Subcontractor(s)	Key Partner(s)
1-8			

GLOSSARY

Specific terms and acronyms used throughout this scope of work are defined as follows:

Term/Acronym	Definition
ASTM	American Society for Testing and Materials – an international organization that develops voluntary-compliance technical standards for a wide range of materials, products, systems, and services.
B100	Pure biodiesel – <i>i.e.</i> , a fuel comprising 100% biodiesel that has not been blended with petroleum diesel
Biodiesel	A renewable fuel for diesel engines comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats
BOD	Biological Oxygen Demand -- The amount of oxygen required by aerobic microorganisms to decompose the organic matter in a sample of water (used as a measure of the degree of water contamination)
CPR	Critical Project Review
D6751	The ASTM Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels
Energy Commission	California Energy Commission
M&V	Measurement and Verification
MCC	Motor Control Center -- An assembly of one or more devices or

Term/Acronym	Definition
	groups of devices that serve to govern in some predetermined manner the performance of electric motors.
P&ID	Process and Instrumentation Diagram
PIER	Public Interest Energy Research
PLC	Programmable Logic Controller -- A digital computer used for automation of electromechanical processes (such as control of industrial process machinery).
RD&D	Research, Development and Demonstration
RO	Reverse Osmosis -- A process by which a solvent (such as water) is purified of solutes by being forced through a semi-permeable membrane through which the solvent, but not the solutes, may pass.
TDS	Total Dissolved Solids – The concentration of all dissolved substances contained in water (<i>i.e.</i> , solids remaining after evaporation of a water sample).
TSS	Total Suspended Solids -- A measure of the suspended solids (small particles of solid material held in suspension in a solution) contained in water.
UF	Ultrafiltration -- The filtration of colloidal substances through a semi-permeable medium that allows only the passage of small molecules.

Problem Statement:

The Recipient will demonstrate an integrated system, which includes a combination of distillation, ultrafiltration and reverse osmosis technologies, for treating and recycling spent biodiesel wash water. This system is anticipated to reduce the consumption of water for biodiesel washing with an ultimate goal of identifying a zero-discharge wash process. Ultrafiltration and reverse osmosis have been used successfully to reduce wastewater Biological Oxygen Demand (BOD) and salinity in a variety of industrial applications (e.g., vegetable oil refining, food processing, etc.), but they have not been applied to the specific challenges of treating effluent from biodiesel production. While reverse osmosis has not been commonly applied to removing glycerol (one of the key impurities in wastewater generated by biodiesel production) from water streams, it is widely used in power plants to separate water and ethylene glycol (which is structurally similar to glycerol and expected to interact analogously with reverse osmosis membranes). Filter Innovations, Inc. has successfully piloted an ultrafiltration/reverse osmosis unit designed to remove salts and glycerol from wastewater generated by a food processing plant in Ohio. This technology is one of the integrated wastewater treatment/recycling systems that will be evaluated during the project.

This project will constitute the first industrial-scale demonstration of treating effluent from biodiesel production using a combination of these technologies. The data generated by this project will help address key questions for prospective users considering a similar installation:

- Will the system efficiently remove impurities from spent biodiesel wash water

(methanol, glycerol, soaps, salts, and emulsified solids)?

- Can the system be installed and operated cost-effectively?
- Will the system result in a drop-off in product quality relative to biodiesel washed with non-recycled water?
- What percentages of water recovery and reuse can be achieved at various costs?

Successful implementation of this project will be a critical step in advancing this technology beyond the later phase of the “Valley of Death” in research and development – i.e., developing an immature technology to the point where key scientific and technological barriers have been overcome sufficiently such that investors are willing to invest in the final stages of development and transition the technology into industrial applications.

Goals of the Agreement:

The goal of this Agreement is to provide an industrial-scale demonstration of an integrated system of emerging technologies for treating/recycling spent wash water from the biodiesel production process. It must be proven that the technology will greatly reduce water consumption and wastewater discharge associated with the conventional biodiesel production process, without negatively impacting product quality or incurring prohibitively high costs and/or energy consumption. A successful demonstration will contribute significantly to commercializing the technology and attaining its widespread deployment, thereby lowering one of the most significant sustainability barriers associated with growth of the biodiesel industry in California.

Objectives of the Agreement:

The objectives of this project are to:

1. Determine the amount of wash column discharge that can be treated by the system and re-used for washing crude biodiesel. The amount of wash column discharge recovered will be equivalent to the amount by which the water consumption of the wash process is reduced.
2. Verify that the amount and composition of the ultrafiltration and reverse osmosis retentate is appropriate for blending with the crude glycerin co-product.
3. Verify that the spent wash water treated by the system is purified to the extent that it can be effectively re-used for washing crude biodiesel.
4. Verify that the finished biodiesel produced using recycled wash water is of comparable quality to biodiesel produced using new wash water and meets all ASTM D6751 fuel quality specifications for biodiesel (B100).
5. Determine the cost and energy consumption (electricity and gas) associated with operating the system and compare to the cost and energy consumption

associated with water use and wastewater disposal without an on-site treatment system.

As described in the M&V plan in the project narrative, the water fluxes and energy consumption (electricity and gas) will be monitored and recorded continuously by the existing programmable logic controller (PLC) system at the facility. Water and fuel quality will be monitored by analyses of discreet samples collected regularly from different points in the process during operations.

Product Guidelines:

For complete product guidelines, refer to Section 5 in the Terms and Conditions.

TASK 1 ADMINISTRATION

Task 1.1 Attend Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

The Recipient shall:

- Attend a “Kick-Off” meeting with the Commission Project Manager, the Grants Officer, and a representative of the Accounting Office. The Recipient shall bring its Project Manager, Agreement Administrator, Accounting Officer, and others designated by the Commission Project Manager to this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting. Prior to the kick-off meeting, the Commission Project Manager will provide an agenda to all potential meeting participants.

The administrative portion of the meeting shall include, but not be limited to, the following:

- Discussion of the terms and conditions of the Agreement
- Discussion of Critical Project Review (Task 1.2)
- Match fund documentation (Task 1.6)
- Permit documentation (Task 1.7)

The technical portion of the meeting shall include, but not be limited to, the following:

- The Commission Project Manager’s expectations for accomplishing tasks described in the Scope of Work
- An updated Schedule of Products
- Discussion of Progress Reports (Task 1.4)
- Discussion of Technical Products (Product Guidelines located in Section 5 of the Terms and Conditions)
- Discussion of the Final Report (Task 1.5)

The Commission Project Manager shall:

- Designate the date and location of this meeting.

Recipient Products:

- Updated Schedule of Products (no draft)
- Updated List of Match Funds (no draft)
- Updated List of Permits (no draft)

Commission Project Manager Product:

- Kick-Off Meeting Agenda (no draft)

Task 1.2 Critical Project Review (CPR) Meetings

The goal of this task is to determine if the project should continue to receive Energy Commission funding to complete this Agreement and to identify any needed modifications to the tasks, products, schedule or budget.

CPRs provide the opportunity for frank discussions between the Energy Commission and the Recipient. CPRs generally take place at key, predetermined points in the Agreement, as determined by the Commission Project Manager and as shown in the Technical Task List above. However, the Commission Project Manager may schedule additional CPRs as necessary, and any additional costs will be borne by the Recipient.

Participants include the Commission Project Manager and the Recipient and may include the Commission Grants Officer, the Public Interest Energy Research (PIER) Program Team Lead, other Energy Commission staff and Management as well as other individuals selected by the Commission Project Manager to provide support to the Energy Commission.

The Commission Project Manager shall:

- Determine the location, date, and time of each CPR meeting with the Recipient. These meetings generally take place at the Energy Commission, but they may take place at another location.
- Send the Recipient the agenda and a list of expected participants in advance of each CPR. If applicable, the agenda shall include a discussion on both match funding and permits.
- Conduct and make a record of each CPR meeting. One of the outcomes of this meeting will be a schedule for providing the written determination described below.
- Determine whether to continue the project, and if continuing, whether or not modifications are needed to the tasks, schedule, products, and/or budget for the remainder of the Agreement. Modifications to the Agreement may require a formal amendment (please see the Terms and Conditions). If the Commission Project Manager concludes that satisfactory progress is not being made, this conclusion will be referred to the Energy Commission's Research, Development and Demonstration

- (RD&D) Policy Committee for its concurrence.
- Provide the Recipient with a written determination in accordance with the schedule. The written response may include a requirement for the Recipient to revise one or more product(s) that were included in the CPR.

The Recipient shall:

- Prepare a CPR Report for each CPR that discusses the progress of the Agreement toward achieving its goals and objectives. This report shall include recommendations and conclusions regarding continued work of the projects. This report shall be submitted along with any other products identified in this scope of work. The Recipient shall submit these documents to the Commission Project Manager and any other designated reviewers at least 15 working days in advance of each CPR meeting.
- Present the required information at each CPR meeting and participate in a discussion about the Agreement.

Commission Project Manager Products:

- Agenda and a list of expected participants (no draft)
- Schedule for written determination (no draft)
- Written determination (no draft)

Recipient Product:

- CPR Report(s) (no draft)

Task 1.3 Final Meeting

The goal of this task is to closeout this Agreement.

The Recipient shall:

- Meet with Energy Commission staff to present the findings, conclusions, and recommendations. The final meeting must be completed during the closeout of this Agreement.

This meeting will be attended by, at a minimum, the Recipient, the Commission Grants Office Officer, and the Commission Project Manager. The technical and administrative aspects of Agreement closeout will be discussed at the meeting, which may be two separate meetings at the discretion of the Commission Project Manager.

The technical portion of the meeting shall present an assessment of the degree to which project and task goals and objectives were achieved, findings, conclusions, recommended next steps (if any) for the Agreement,

and recommendations for improvements. The Commission Project Manager will determine the appropriate meeting participants.

The administrative portion of the meeting shall be a discussion with the Commission Project Manager and the Grants Officer about the following Agreement closeout items:

- What to do with any equipment purchased with Energy Commission funds (Options)
- Energy Commission's request for specific "generated" data (not already provided in Agreement products)
- Need to document Recipient's disclosure of "subject inventions" developed under the Agreement
- "Surviving" Agreement provisions, such as repayment provisions and confidential Products
- Final invoicing and release of retention
- Prepare a schedule for completing the closeout activities for this Agreement

Products:

- Written documentation of meeting agreements (no draft)
- Schedule for completing closeout activities (no draft)

Task 1.4 Monthly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the research objectives of this Agreement on time and within budget.

The objectives of this task are to summarize activities performed during the reporting period, to identify activities planned for the next reporting period, to identify issues that may affect performance and expenditures, and to form the basis for determining whether invoices are consistent with work performed.

The Recipient shall:

- Prepare a Monthly Progress Report which summarizes all Agreement activities conducted by the Recipient for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due to the Commission Project Manager within 10 days of the end of the reporting period. The recommended specifications for each progress report are contained in Exhibit A, Attachment A-2.

Product:

- Monthly Progress Reports (no draft)

Task 1.5 Final Report

The goal of the Final Report is to assess the project's success in achieving its goals and objectives, advancing science and technology, and providing energy-related and other benefits to California.

The objectives of the Final Report are to clearly and completely describe the project's purpose, approach, activities performed, results, and advancements in science and technology; to present a public assessment of the success of the project as measured by the degree to which goals and objectives were achieved; to make insightful observations based on results obtained; to draw conclusions; and to make recommendations for further RD&D projects and improvements to the PIER project management processes.

The Final Report shall be a public document. If the Recipient has obtained confidential status from the Energy Commission and will be preparing a confidential version of the Final Report as well, the Recipient shall perform the following activities for both the public and confidential versions of the Final Report.

The Recipient shall:

- Prepare an Outline of the Final Report.
- Prepare a Final Report following the approved outline and the latest version of the PIER Final Report guidelines published on the Energy Commission's website at <http://www.energy.ca.gov/contracts/pier/contractors/index.html> at the time the Recipient begins performing this task, unless otherwise instructed in writing by the Commission Project Manager. Instead of the timeframe listed in the Product Guidelines located in Section 5 of the Terms and Conditions, the Commission Project Manager shall provide written comments on the Draft Final Report within fifteen (15) working days of receipt. The Final Report must be completed on or before the end of the Agreement Term.
- Submit one bound copy of the Final Report with the final invoice.

Products:

- Draft Outline of the Final Report
- Final Outline of the Final Report
- Draft Final Report
- Final Report

Task 1.6 Identify and Obtain Matching Funds

The goal of this task is to ensure that the match funds planned for this Agreement are obtained for and applied to this Agreement during the term of this Agreement.

The costs to obtain and document match fund commitments are not reimbursable through this Agreement. Although the PIER budget for this task will be zero dollars, the Recipient may utilize match funds for this task. Match funds shall be spent concurrently or in advance of PIER funds for each task during the term of this Agreement. Match funds must be identified in writing and the associated commitments obtained before the Recipient can incur any costs for which the Recipient will request reimbursement.

The Recipient shall:

- Prepare a letter documenting the match funding committed to this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. If no match funds were part of the proposal that led to the Energy Commission awarding this Agreement and none have been identified at the time this Agreement starts, then state such in the letter. If match funds were a part of the proposal that led to the Energy Commission awarding this Agreement, then provide in the letter a list of the match funds that identifies the:
 - Amount of each cash match fund, its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied
 - Amount of each in-kind contribution, a description, documented market or book value, and its source, including a contact name, address and telephone number and the task(s) to which the match funds will be applied. If the in-kind contribution is equipment or other tangible or real property, the Recipient shall identify its owner and provide a contact name, address and telephone number, and the address where the property is located
- Provide a copy of the letter of commitment from an authorized representative of each source of cash match funding or in-kind contributions that these funds or contributions have been secured.
- Discuss match funds and the implications to the Agreement if they are reduced or not obtained as committed, at the kick-off meeting. If applicable, match funds will be included as a line item in the progress reports and will be a topic at CPR meetings.
- Provide the appropriate information to the Commission Project Manager if during the course of the Agreement additional match funds are received.
- Notify the Commission Project Manager within 10 days if during the course of the Agreement existing match funds are reduced. Reduction in match funds must be approved through a formal amendment to the Agreement and may trigger an additional CPR.

Products:

- A letter regarding match funds or stating that no match funds are provided (no draft)
- Copy(ies) of each match fund commitment letter(s) (if applicable) (no draft)

- Letter(s) for new match funds (if applicable) (no draft)
- Letter that match funds were reduced (if applicable) (no draft)

Task 1.7 Identify and Obtain Required Permits

The goal of this task is to obtain all permits required for work completed under this Agreement in advance of the date they are needed to keep the Agreement schedule on track.

Permit costs and the expenses associated with obtaining permits are not reimbursable under this Agreement. Although the PIER budget for this task will be zero dollars, the Recipient shall budget match funds for any expected expenditures associated with obtaining permits. Permits must be identified in writing and obtained before the Recipient can make any expenditures for which a permit is required.

The Recipient shall:

- Prepare a letter documenting the permits required to conduct this Agreement and submit it to the Commission Project Manager at least 2 working days prior to the kick-off meeting. If there are no permits required at the start of this Agreement, then state such in the letter. If it is known at the beginning of the Agreement that permits will be required during the course of the Agreement, provide in the letter:
 - A list of the permits that identifies the:
 - Type of permit
 - Name, address and telephone number of the permitting jurisdictions or lead agencies
- The schedule the Recipient will follow in applying for and obtaining these permits.
- Discuss the list of permits and the schedule for obtaining them at the kick-off meeting and develop a timetable for submitting the updated list, schedule and the copies of the permits. The implications to the Agreement if the permits are not obtained in a timely fashion or are denied will also be discussed. If applicable, permits will be included as a line item in the Progress Reports and will be a topic at CPR meetings.
- If during the course of the Agreement additional permits become necessary, provide the appropriate information on each permit and an updated schedule to the Commission Project Manager.
- As permits are obtained, send a copy of each approved permit to the Commission Project Manager.
- If during the course of the Agreement permits are not obtained on time or are denied, notify the Commission Project Manager within 10 days. Either of these events may trigger an additional CPR.

Products:

- Letter documenting the permits or stating that no permits are required (no

- draft)
- A copy of each approved permit (if applicable) (no draft)
- Updated list of permits as they change during the term of the Agreement (if applicable) (no draft)
- Updated schedule for acquiring permits as changes occur during the term of the Agreement (if applicable) (no draft)

TECHNICAL TASKS

TASK 2 FINALIZE DESIGN FOR WATER TREATMENT/RECYCLING SYSTEM

The goal of this task is to complete the design engineering for the integrated water treatment/recycling system. Implementation of this task will produce an updated mass balance, a set of process and instrumentation diagrams (P&IDs), and an equipment list for the system.

The Recipient shall:

- Update the mass balance for the system, which shall contain the flow rates and chemical composition (including, but not limited to, methanol, glycerol, soaps, BOD, TSS, TDS) of all water fluxes within the system. The updated mass balance will incorporate new information about wash column operating conditions and discharge composition that has been obtained since the preliminary system design was completed. Provide report on the updates to the mass balance.
- Produce a complete set of process and instrumentation diagrams. The P&IDs will comprise a set of single-line diagrams showing the interconnection of process equipment and the instrumentation used to control the process.
- Produce an equipment list for the system. The equipment list shall include information about all of the specific pieces of equipment that will need to be purchased – *i.e.*, major system components and related process equipment (pumps, valves, etc.) and instrumentation/controls (temperature and pressure indicators, flow meters, level controllers, etc.).
- Participate in a CPR as per Task 1.2

Products:

- Report on updated mass balance (no draft)
- Process and instrumentation diagrams (no draft)
- Equipment list (no draft)

TASK 3 EQUIPMENT PROCUREMENT

The goal of this task is to procure all of the components of the water treatment/recycling system (as specified by the equipment list) in preparation for installation/construction.

The Recipient shall:

- Contact all applicable equipment manufacturers/vendors to obtain competitive bids.
- Evaluate proposals and place orders for all of the items on the equipment list.
- Take delivery of the equipment at the project site (Recipient's existing biodiesel production facility at Port of Stockton, CA) and store it securely onsite prior to the start of installation/construction.
- Prepare the Purchased Equipment Report. This report shall include a listing and brief description of all pieces of equipment that were purchased and verification that they have been delivered intact to the project site.

Products:

- Purchased Equipment Report (no draft)

TASK 4 PREPARE DETAILED CONSTRUCTION DRAWINGS FOR WATER TREATMENT/RECYCLING SYSTEM

The goal of this task is to produce a complete set of construction drawings (architectural, piping, electrical, and instrumentation/controls) for the system. These drawings will provide contractors with the detailed information required for installation/construction of the system.

The Recipient shall:

- Work with the applicable contractors to produce architectural and piping drawings for submission to the Commission Project Manager. The architectural drawings will contain information about the physical layout and structural assembly of system components (floor plan, elevations, section details, etc.). The piping drawings will contain information about the water and steam piping connecting system components to each other and to the existing biodiesel production equipment at the project site.
- Work with the applicable contractors to produce electrical drawings for submission to the Commission Project Manager. These drawings will contain information about all of the electrical components of the system (layout, wiring, circuitry, connections to existing electrical panels, etc.).
- Work with the applicable contractors to produce controls/instrumentation drawings for submission to the Commission Project Manager. These drawings will contain information about all instrumentation and controls

components of the system and their connections to the existing motor control center (MCC) and PLC of the biodiesel production facility at the project site.

Products:

- Architectural and piping drawings (no draft)
- Electrical drawings (no draft)
- Controls/instrumentation drawings (no draft)

TASK 5 EQUIPMENT INSTALLATION

The goal of this task is to install all of the equipment comprising the water treatment/recycling system and integrate it with the existing biodiesel production facility at the project site. This will include the physical installation/construction of all system components as well as programming the existing PLC to incorporate the system. Implementation of this task will result in the water treatment/recycling system being fully operational and ready for testing.

The Recipient shall:

- Supervise the installation of system equipment by the contractors (mechanical engineering/construction, controls engineering/systems integration, and electrical).
- Supervise the programming of the PLC by the controls engineering/systems integration contractor.
- Prepare the Equipment Installation Report. This report shall include, but is not limited to, a description of the system as-installed, photographs of installed system components, and screen images from control system computers related to the water treatment/recycling system.
- Participate in a CPR as per Task 1.2.

Products:

- Equipment Installation Report (no draft)

TASK 6 PREPARATION AND IMPLEMENTATION OF TEST PLAN

The goal of this task is to prepare and implement a plan for operating and testing the performance of the water treatment/recycling system. This will include continuously logging system data through the PLC and performing chemical analyses on discrete samples collected regularly from various points within the system. The results will provide a basis for evaluation of the technical and economic performance of the system.

The Recipient shall:

- Prepare the Test Plan. This plan shall include, but is not limited to, planned hours of operation for the water treatment/recycling system, anticipated ranges of key operating conditions, data acquisition rate and

averaging procedure for system variables logged by PLC, and listing of sampling frequency and analyses for regular discreet water samples that will be regularly collected from various points within the system.

- Conduct research and data collection in accordance with the Test Plan.
- Prepare the Test Results Report. This report shall include, but is not limited to, a summary of operating conditions for the system over the testing period, raw and/or averaged data from continuous PLC logging, results of water quality analyses performed on discreet samples, and calculations of key technical and economic performance measures (e.g., percentage of wash column discharge recovered by system, consumption of electricity and natural gas per gallon of wash water processed, total operational costs per gallon of wash water processed, etc.). This report should clearly link the test results back to the objectives and goals of this agreement.

Products:

- Test Plan (no draft)
- Draft Test Results Report
- Final Test Results Report

TASK 7 TECHNOLOGY TRANSFER ACTIVITIES

The goal of this task is to develop a plan to make the knowledge gained, experimental results and lessons learned available to key decision-makers.

The Recipient shall:

- Prepare a Technology Transfer Plan. The plan shall explain how the knowledge gained in this project will be made available to the public. The level of detail expected is least for research-related projects and highest for demonstration projects. Key elements from this report shall be included in the Final Report for this project.
- Conduct technology transfer activities in accordance with the Technology Transfer Plan. These activities shall be reported in the Monthly Progress Reports.

Products:

- Draft Technology Transfer Plan
- Final Technology Transfer Plan

TASK 8 PRODUCTION READINESS PLAN

The goal of the plan is to determine the steps that will lead to the manufacturing of the technologies developed in this project or to the commercialization of the project's results.

The Recipient shall:

- Prepare a Production Readiness Plan. The degree of detail in the Production Readiness Plan discussion should be proportional to the complexity of producing or commercializing the product and its state of development. The plan shall include, as appropriate, but not be limited to:
 - Identification of critical production processes, equipment, facilities, personnel resources, and support systems that will be needed to produce a commercially viable product.
 - Internal manufacturing facilities, as well as supplier technologies, capacity constraints imposed by the design under consideration, identification of design critical elements and the use of hazardous or non-recyclable materials. The product manufacturing effort may include “proof of production processes.”
 - A projected “should cost” for the product when in production.
 - The expected investment threshold to launch the commercial product.
 - An implementation plan to ramp up to full production.

Products:

- Draft Production Readiness Plan
- Final Production Readiness Plan